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Editorial

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## **Emerging Services for Internet of Things**

Internet of Things (IoT) has emerged to support a state-of-the-art for modern services for all emerging devices and connecting to the cloud. At the same time, IoT is one of the main source of data for Big Data Processing. The rapid adoption of IoT with unprecedented bandwidths and computational power in instrumentation devices have produced ground-breaking service delivery in real-time. These capabilities enable instant access and transfer of information to maximize the possible gains of all kinds. Emerging services are the term to describe the modern types of services that IoT can offer to improve the quality of services and experiences by speeding up the requests, reducing complexity and using methods involved with Big Data, Cloud etc. to make services seamlessly. Emerging IoT services can complete many requests such as ordering products, logistics, education, finance, healthcare, industrial IoT, and smart cities without spending much time and effort. Analysis of data can show people's choices, rating and feedback for services.

There are key research issues on emerging IoT based application such as location privacy, cognitive issues of IoT to discover how much it can adapt ubiquitous intelligence about us and our surroundings, the environment so we can create smart living and smart cities, etc. This special issue has carefully selected very interesting papers on:

Efficient location privacy algorithm for Internet of Things (IoT) services and applications by Sun, et al. discusses an interesting approach to location base service computing with intelligent dummy location selection (DLS) algorithm. This paper has developed an intuitive IoT service to analyze the current dummy-location selection (DLS) which provides an efficient location privacy preservation approach and design an attack algorithm for DLS (ADLS) for test emerging IoT security. For efficiently preserving user's location privacy, this paper has also proposed a novel dummy location privacy-preserving (DLP) algorithm by considering both computational costs and various privacy requirements of different users. The authors have tested their algorithms with number of simulations for various scenarios.

Energy efficient wireless communication technique based on Cognitive Radio (CR) for Internet of Things by Qureshi, et al. have proposed a, elegant model for integration of IoT with CR technology. This paper has proposed Reliable, Intelligent and Smart Cognitive Radio protocol which consumes less computational time and transmits energy with high throughput, as compared to the benchmark Cognitive Radio MAC (CR-MAC) protocols. This paper has also provided new applications of CR technology for IoT and has proposed an effective solution to the real challenges in CR technology that will make IoT more affordable and applicable.

Lightweight distributed secure data management system for health internet of things by Yang, Y. et al. have proposed an interesting distributed secure data management with keyword search system for health IoT. This paper has proposed a novel distributed secure data management with keyword search system for health IoT. Since the patients are usually managed by diverse medical institutions, the proposed system enables distributed access control of protected health information (PHI) among different medical domains. The proposed scheme could provide efficient keyword search function on cross-domain PHI. For the resource limited devices in health IoT, it is an essential requirement to design lightweight algorithms in the secure data management system.

A new elastic trickle timer algorithm for Internet of Things by Yassien, M. B et al. have discovered on the development of an Enhanced Trickle algorithm (E-Trickle) algorithm to get rid of the listen only period. The proposed algorithm was incorporated in the Routing Protocol for Low Power and Lossy

Networks (RPL). Different network densities were used to evaluate the simulation experiments. This paper has conducted measurement of the simulation experiments on various performance metrics such as packet delivery ratio (PDR), convergence time, and power consumption. Their simulation results have revealed that in terms of energy consumption, the new algorithm exhibited superior performance characteristics.

An efficient power saving polling scheme in the internet of energy by Chen, C. et al. have produced the compressed Bitmap scheme for their Power Saving polling scheme for SG in the Internet of Energy (PSSG), could greatly reduce the communication overheads. Numerical results show that our scheme is better than the Power Saving Mechanism (PSM) and Power Save Multi-Poll (PSMP) protocols in terms of overheads, throughput, average awaken time and energy consumptions.

A bio-signal based framework to secure mobile devices, Kumar, P. et al. have developed a new framework to secure mobile devices using EEG signals along with existing pattern-based authentication passwords has been used as identification tokens. This paper has investigated the use of EEG signals recorded during pattern drawing over the screen of the mobile device in the authentication phase for which they have collected EEG signals of 50 users while drawing different patterns. The robustness of the system has been evaluated against 2400 unauthorized attempts made by 30 unauthorized users who have tried to gain access of the device using known patterns of 20 genuine users. EEG signals have been modeled using Hidden Markov Model (HMM), and using a binary classifier implemented with Support Vector Machine (SVM) to verify the authenticity of a test pattern.

An efficient authentication and key agreement scheme for multi-gateway wireless sensor networks in IoT deployment by Wu, F et al. have developed Novel and efficient authentication and key agreement scheme for WSN. They have also proposed five phases in the proposed multi-gateway scheme, namely: initialization, registration, login, authentication and key agreement, and password change. This paper has also demonstrated the security of the proposed scheme using Proverif, as well as evaluating the good performance of the scheme using NS-2 simulation. The simulation for three scenarios demonstrates the efficiency of the proposed multi-gateway scheme.

An inferential real-time falling posture reconstruction for Internet of healthcare things by Zang, C et al. have developed an algorithm to reproduce the real-time falls of humans, which uses a triaxial accelerometer and triaxial gyroscope to detect the occurrence of a fall, and an attitude algorithm to estimate the angles of each part of the human body, where Internet of healthcare things collects the information of each sensor, and a Bayesian Network deduces the next action.

An Energy-aware Service Composition Algorithm for Multiple Cloud based IoT Applications by Baker, T et al. have proposed a novel multi-cloud IoT service composition algorithm called (E2C2) that aims at creating an energy-aware composition plan by searching for and integrating the least possible number of IoT services, in order to fulfil user requirements. One of main research challenge in this paper is to tackle the energy efficient composition and interoperability of heterogeneous things integrated with cloud resources and scattered across the globe, in order to create an on-demand energy efficient cloud based IoT application.